

CLAIMS

I claim:

1. In a material harvesting system comprising a harvester, the harvester comprising an air delivery system, a module builder comprising:

a holding chamber in communication with a harvester air delivery system,

a wheeled frame adapted for towing behind a harvester;

a compaction chamber comprising:

at least two compaction side walls; and

a compaction surface oriented between and substantially perpendicular to the compaction sidewalls, nominally vertical, and translatable in a substantially horizontal direction between a leading edge of the compaction chamber and a trailing edge of the compaction chamber at various vertical and near-vertical orientations;

the compaction chamber coupled to the wheeled frame as to receive material from the holding chamber through the chamber top with the compaction surface at the leading edge of the compaction chamber;

compaction means attached to the wheeled frame, coupled to the compaction surface, and operative to translate the compaction surface in a substantially horizontal direction between the compaction chamber leading edge and the compaction chamber trailing edge at various vertical and near-vertical orientations;

a forming chamber coupled to the wheeled frame, having a forming chamber leading edge and a forming chamber trailing edge defined therein, the forming chamber leading edge substantially adjoining and aligned with the trailing edge of the compaction chamber, and

a forming chamber door assembly comprising:

a substantially vertical forming chamber door frame at least spanning the forming chamber trailing edge, coupled to the wheeled frame, and movable toward

and away from the forming chamber trailing edge along the wheeled frame, and

two substantially vertical forming chamber doors hingedly mounted on the forming chamber door frame and movable between open and closed states across the forming chamber trailing edge opening; and

forming chamber door assembly translation means attached to the wheeled frame, coupled to the forming chamber door frame, and operative to translate the forming chamber door frame in a substantially horizontal direction toward and away from the forming chamber trailing edge.

2. The module builder of Claim 1, wherein:
the compaction chamber is coupled to the wheeled frame substantially over the pivot point of the harvester, and
the holding chamber is positioned substantially over the pivot point of the harvester.
3. The module builder of Claim 1, further comprising
a nominally horizontal movable floor attached to the wheeled frame, extending from at least the trailing edge of the forming chamber to substantially the rear of the wheeled frame, and operative to move material on the movable floor at least in a direction away from the forming chamber trailing edge and drop the material off the module builder.
4. The module builder of Claim 3, wherein the movable floor is lowerable to the surface supporting the wheeled frame for off-loading modules.
5. The module builder of Claim 1, wherein the forming chamber cross section increases between the forming chamber leading edge and the forming chamber trailing edge.

6. The module builder of Claim 1, wherein the doors are biased in a closing direction.
7. The module builder of Claim 1, wherein the compaction means are hydraulic.
8. A method for forming modules from un-harvested crops, the method comprising:
providing a harvesting system comprising a harvester and a module builder,
the harvester comprising an air delivery system,
the module builder comprising:
a holding chamber in communication with a harvester air delivery system,
a wheeled frame adapted for towing behind a harvester;
a compaction chamber comprising:
at least two compaction side walls; and
a compaction surface oriented between and substantially
perpendicular to the compaction sidewalls, nominally
vertical, and translatable in a substantially horizontal
direction between a leading edge of the compaction
chamber and a trailing edge of the compaction chamber at
various vertical and near-vertical orientations;
the compaction chamber coupled to the wheeled frame as to receive
material from the holding chamber through the chamber top with
the compaction surface at the leading edge of the compaction
chamber;
compaction means attached to the wheeled frame, coupled to the
compaction surface, and operative to translate the compaction
surface in a substantially horizontal direction between the
compaction chamber leading edge and the compaction chamber
trailing edge at various vertical and near-vertical orientations;

a forming chamber coupled to the wheeled frame, having a forming chamber leading edge and a forming chamber trailing edge defined therein, the forming chamber leading edge substantially adjoining and aligned with the trailing edge of the compaction chamber, and comprising:

a forming chamber door assembly comprising:

a substantially vertical forming chamber door frame at least spanning the forming chamber trailing edge, coupled to the wheeled frame, and movable toward and away from the forming chamber trailing edge along the wheeled frame, and

two substantially vertical forming chamber doors hingedly mounted on the forming chamber door frame and movable between open and closed states across the forming chamber trailing edge opening; and

forming chamber door assembly translation means attached to the wheeled frame, coupled to the forming chamber door frame, and operative to translate the forming chamber door frame in a substantially horizontal direction toward and away from the forming chamber trailing edge; and

in the harvester:

stripping crop from a plurality of plants;

entraining stripped crop in the air delivery system;

in the module builder:

holding entrained crop in the holding chamber;

beginning with the compaction surface substantially parallel to the compaction chamber leading edge, the door frame releasably secured substantially against the trailing edge of the forming chamber, and the doors closed on

the door frame, repeating the following steps until a module of preset length is formed:

opening the holding chamber, thereby concurrently filling the compaction chamber and the forming chamber with crop from the holding chamber;

closing the holding chamber upon the fill-level in the compaction chamber reaching a preset level;

orienting the compaction surface such that the top edge of the compaction surface leans toward the rear of the wheeled frame;

translating the compaction surface horizontally through the compaction chamber to the compaction chamber trailing edge, thereby compacting crop into the forming chamber

translating the compaction surface horizontally through the compaction chamber substantially to the compaction chamber leading edge, and

orienting the compaction surface substantially parallel to the compaction chamber leading edge;

when the horizontal force of formed cotton exceeds the preset value, releasing the door frame to move, by the horizontal force of compacted and formed cotton, horizontally toward the rear of the module builder;

at a preset point, releasing the doors to open, retaining a bias force of the doors against the sides of the module as the module passes through the door frame;

upon forming a module of preset length, translating the compaction surface through the forming chamber, thereby moving the formed module toward the rear of the module builder.

9. The method of Claim 8 wherein the steps in the module builder occur concurrent with the steps in the harvester.
10. A method for forming modules from harvested crops, the method comprising:
providing a module builder comprising:
a holding chamber in communication with a harvester,
a wheeled frame adapted for towing behind a harvester;
a compaction chamber comprising:
at least two compaction side walls; and
a compaction surface oriented between and substantially perpendicular to
the compaction sidewalls, nominally vertical, and translatable in a
substantially horizontal direction between a leading edge of the
compaction chamber and a trailing edge of the compaction
chamber at various vertical and near-vertical orientations;
the compaction chamber coupled to the wheeled frame as to receive material from
the holding chamber through the chamber top with the compaction surface
at the leading edge of the compaction chamber;
compaction means attached to the wheeled frame, coupled to the compaction
surface, and operative to translate the compaction surface in a
substantially horizontal direction between the compaction chamber
leading edge and the compaction chamber trailing edge at various vertical
and near-vertical orientations;
a forming chamber coupled to the wheeled frame, having a forming chamber
leading edge and a forming chamber trailing edge defined therein, the
forming chamber leading edge substantially adjoining and aligned with the
trailing edge of the compaction chamber, and comprising:
a forming chamber door assembly comprising:

a substantially vertical forming chamber door frame at least spanning the forming chamber trailing edge, coupled to the wheeled frame, and movable toward and away from the forming chamber trailing edge along the wheeled frame, and

two substantially vertical forming chamber doors hingedly mounted on the forming chamber door frame and movable between open and closed states across the forming chamber trailing edge opening; and

forming chamber door assembly translation means attached to the wheeled frame, coupled to the forming chamber door frame, and operative to translate the forming chamber door frame in a substantially horizontal direction toward and away from the forming chamber trailing edge; and

a nominally horizontal movable floor attached to the wheeled frame, extending from at least the trailing edge of the forming chamber to substantially the rear of the wheeled frame, and operative to move material on the movable floor at least in a direction away from the forming chamber trailing edge and drop the material off the module builder.

holding harvested crop in the holding chamber;

beginning with the compaction surface substantially parallel to the compaction chamber leading edge, the door frame releasably secured substantially against the trailing edge of the forming chamber, and the doors closed on the door frame, repeating the following steps until a module of preset length is formed:

opening the holding chamber, thereby concurrently filling the compaction chamber and the forming chamber with crop from the holding chamber;

closing the holding chamber upon the fill-level in the compaction chamber reaching a preset level;

orienting the compaction surface such that the top edge of the compaction surface leans toward the rear of the wheeled frame;

translating the compaction surface horizontally through the compaction chamber to the compaction chamber trailing edge, thereby compacting crop into the forming chamber

translating the compaction surface horizontally through the compaction chamber substantially to the compaction chamber leading edge, and

orienting the compaction surface substantially parallel to the compaction chamber leading edge;

when the horizontal force of formed cotton exceeds the preset value, releasing the door frame to move, by the horizontal force of compacted and formed cotton, horizontally toward the rear of the module builder;

at a preset point, releasing the doors to open, retaining a bias force of the doors against the sides of the module as the module passes through the door frame;

upon forming a module of preset length, translating the compaction surface through the forming chamber, thereby moving the formed module toward the rear of the module builder.